

GRACE

Construction Products Division

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February 14, 1980

Office of the Secretary
Consumer Product Safety Commission
Washington, D.C. 20207

Re: Asbestos

Gentlemen:

There follow comments of the Construction Products Division of W. R. Grace & Co. ("Grace") in response to the Advance Notice of Proposed Rulemaking ("ANPR") relating to Consumer Products Containing Asbestos published in Part VI of the October 17, 1979 issue of the FEDERAL REGISTER ("CPSC ANPR"), as extended by CPSC FEDERAL REGISTER notice published on December 17, 1979. Because of the interrelationship between said CPSC ANPR and the ANPR published simultaneously by the Environmental Protection Agency's Office of Toxic Substances relating to Commercial and Industrial Use of Asbestos Fibers ("EPA ANPR"), these comments are also being forwarded to EPA in response to the EPA ANPR.

Many of the issues which these comments address have previously been explored in considerable detail by various government agencies, including CPSC and EPA, who from time to time have dealt with the issue of human exposure to asbestos fibers, and information relating to said issue may be found in the files of such agencies.

Nevertheless, Grace deems it appropriate to submit these comments in the spirit of the Joint Statement on Coordination of Regulatory Activities which highlighted the desire of CPSC and EPA to avoid inconsistent or needlessly burdensome regulations while addressing the need to reduce unreasonable human health risk from exposure to asbestos fibers.

The purpose of these comments is:

(a) to address the issue of naturally occurring, inadvertent asbestos contamination as it relates to vermiculite;

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(b) to review the uses and importance of vermiculite and Grace's efforts to reduce contamination;

(c) to oppose CPSC's proposed regulatory approach as it relates to the asbestos contamination issue;

(d) to recommend that to the extent the issue of asbestos contamination is addressed, the resources of EPA be employed; and

(e) to comment briefly upon the "generic" approach to the question of asbestos contamination.

Inadvertent Contamination

"Rock types in which asbestos minerals might be encountered lie at or near the surface of about 30 to 40 percent of the Continental United States." 1/ Important mineral deposits are sometimes found in areas where asbestos materials occur and include vermiculite, copper, gold, and talc. The inadvertent mineral contaminant form generally associated with vermiculite is tremolite 2/ which appears in both a fibrous and a non-fibrous

1/ Study of Adverse Effects of Solid Wastes from all mining activities on the Environment, prepared by PEDCo Environmental for EPA, Draft dated January 10, 1979, pp. 251 to 257.

2/ This fact is documented in agency files.

See, e.g., EPA Report No. EPA-650/2-74-087, Battelle Columbus Laboratories "Identification and Assessment of Asbestos Emissions from Incidental Sources of Asbestos", September 1974, pp. A133/8. This report at page 2 also states that "asbestos is present as an accessory mineral in significant quantity in ores mined in many areas of the United States... ."

CPSC Office of Program Management Report dated March 14, 1979 containing memorandum "Asbestos in Vermiculite" dated January 24, 1979 from Dale Ray, HICP.

In addition, the issue of asbestos contamination in vermiculite is known to OSHA and MSHA and was extensively discussed with the EPA staff during the development of the National Emission Standard for Asbestos, U.S., EPA Regulations 40 CFR Chapter 1, Subsection 61.22 promulgated April 5, 1973.

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form. Although it appears that only fibrous tremolite with asbestiform characteristics is a source of concern, the Government's regulatory approach does not necessarily distinguish between the two forms, and additional research has been recommended in this area. 3/

Grace is a producer of vermiculite ore which it mines near Libby, Montana and in the vicinity of Enoree, South Carolina. There is associated with these vermiculite deposits fibrous tremolite which is subject to regulation under the Mine Safety and Health Administration's Asbestos Exposure Standard 30 CFR 55.5 and the OSHA Asbestos Standard 29 CFR 1910.1001. Mine worker exposure to this tremolite contamination at Grace's Libby, Montana and Enoree, South Carolina mills is well below the 2 fiber 8 hour TWA airborne concentration MSHA standard.

Vermiculite has its greatest utility in its expanded form, and in addition to its mining and milling operations Grace operates 30 expanding plants in 26 states. Grace vermiculite ore customers also operate vermiculite expanding plants. Grace's expanding plants are small and, typically, the number of employees at any one expanding plant location is less than 12. Worker exposure to tremolite fibers at Grace's vermiculite expanding plants is also well below the 2 fiber 8 hour TWA exposure limits. Because of their specialized nature all vermiculite expanding plants are generally unsuited to other uses and very few non-vermiculite products are manufactured by Grace at expanding plant locations.

Reduction of Contamination

Mill Operations

Grace believes that the most effective way to reduce asbestiform mineral contamination is to reduce it at the source and has directed much of its efforts to this end. Grace has expended substantial sums for new vermiculite milling equipment at its Libby, Montana location which employs new and efficient wet flotation screening, drying,

3/ See Bureau of Mines Report of Investigations/1979, Relationship of Mineral Habit to Size Characteristics for Tremolite Cleavage Fragments and Fibers.

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and handling equipment to separate vermiculite from rock and other worthless materials and contaminants and which produce a vermiculite ore which is free from extraneous matter and contaminants, such as fibrous tremolite, to the maximum extent feasible. Similar methods are utilized at the Enoree, South Carolina milling operation.

Although the amount of contaminant materials may vary with ore size, Grace calculates that the methods which Grace has employed to date at the milling operations have been successful in reducing the amount of fibrous tremolite contaminant in the vermiculite ore shipped to the processing plants to an average approximate range of 1/2 of 1% on a dry weight basis. 4/

Expanding Operations

Grace estimates that fully more than 95% of vermiculite ore produced is ultimately utilized in its expanded form, primarily in commercial and industrial applications.

As part of the expansion process additional rock and other worthless materials and contaminants are removed. The removal process utilizes closed system air elutriation, and final screening of materials as well as cyclones and bag houses to prevent recirculation of airborne contaminants into finished products. Grace calculates that on average the percent fibrous tremolite contamination is further reduced in its expansion process by more than 75%. For expanded vermiculite products the lowest level of reliable detectability for tremolite contamination is 2/10ths of 1% on a dry weight basis. Grace's expanded vermiculite products are on the average at or below this level.

Expenditures

Since 1970 Grace has expended capital costs in excess of \$15 million relating to extraction of worthless materials and contamination and/or airborne fiber reductions in its vermiculite mining, milling, and expanding operations. This expenditure represents 60% of the Construction Products Division's calculated after tax profit on its entire vermiculite business during the period 1970 to the present; it also represents 35% of the total gross fixed assets invested in the vermiculite business.

4/ Grace utilizes the step scanning X-ray diffraction technique to quantify the amount of fibrous tremolite contamination in vermiculite. For a discussion of the limits of this technique see page 13, infra.

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Research is continuing into the problem of vermiculite ore contaminant reduction and more expenditures are planned. For example, in 1980 Grace is budgeting in excess of One-Half Million Dollars for a new rock rejection circuit and air purification system at its Libby, Montana mill to further reduce fibrous tremolite contamination. Experimentation is also in progress utilizing "slot screening" and other vermiculite processing techniques. ^{5/} Grace believes that these facilities and techniques when operational will further reduce vermiculite ore tremolite contamination by as much as 50%.

Technological Facts, Economic
Costs, and Residual Contamination

In the past several years Grace has made significant strides in the task of reducing fibrous tremolite contamination to the maximum extent feasible. The problem which Grace now faces is twofold, i.e., technological and economic.

Minerals of the asbestos type appear as trace contaminants in all known commercial vermiculite deposits. To remove all aspects of fibrous tremolite contaminants from Grace's beneficiated vermiculite ore requires a quantum technological breakthrough which may never be achieved. The problem is made all the more difficult for Grace because expertise and engineering know-how from other mineral mining activities do not readily lend themselves to the unique problems of fibrous tremolite contamination removal associated with the mining, milling, and processing of vermiculite. Accordingly, Grace must rely almost entirely on its own research and development resources to deal with the problem.

Having expended significant money and effort to accomplish more than a 99% reduction in fibrous tremolite contamination associated with vermiculite ore, Grace is now dealing with the remaining residual contamination in the unexpanded and expanded ore, a task which by its nature will be proportionally more difficult when compared to the results obtained to date.

^{5/} Grace considers certain of its milling and processing methods to be confidential, but is willing to discuss the same with CPSC and EPA staffs once acceptable criteria are developed for treatment of confidential data.

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As indicated above, Grace has invested significant capital resources and effort in an attempt to remove fibrous tremolite contaminants from vermiculite ore. Nonetheless, there is no process now known which is capable of completely eliminating all fibrous tremolite contamination from vermiculite. Therefore, it is probable that some tremolite fibers may be released during use of some vermiculite and vermiculite-containing products. Based on the residual level of fibrous tremolite contamination in expanded vermiculite which is at or below the limit of reliable detectability of accepted detection techniques, Grace judges that any tremolite fiber release is at extremely low levels. Grace is attempting to quantify said fiber release levels and will make the results of its efforts known to CPSC on a voluntary basis as soon as practicable.

Regulatory Proceedings -
Reduction to the Maximum Extent Feasible

Because of the fibrous tremolite contamination associated with vermiculite, Grace has noted asbestos regulatory proceedings initiated by EPA and CPSC, embodied in various promulgations, viz., 40 CFR Chapter 1, Subsection 61.22, the National Emission Standard for Asbestos, and 42 FR 63354 (December 15, 1977), the CPSC ban on consumer patching compounds and artificial emberizing materials containing respirable free form asbestos.

The National Emission Standard for Asbestos in pertinent part permits the spraying of asbestos-containing fireproofing materials containing up to 1% asbestos on a dry weight basis. Grace believes that this standard has succeeded in eliminating the intentional addition of commercial asbestos to spray fireproofing products while at the same time avoiding the inadvertent banning of products which contain only trace amounts of asbestos. As indicated above, the average percent fibrous tremolite contamination of vermiculite sold is well within said standard.

The CPSC ban on patching compounds containing intentionally added free form asbestos defined "intentionally added" as follows:

- (1) added deliberately as an ingredient intended to impart specific characteristics, or

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- (2) contained in final product as a result of knowingly using a raw material containing asbestos. Whenever a manufacturer finds out that the finished product contains asbestos, the manufacturer will be considered as knowingly using a raw material containing asbestos unless the manufacturer takes steps to reduce the asbestos to the maximum extent feasible. (Emphasis added)

Grace supports the approach taken by CPSC in the patching compounds rule and believes that the matters detailed above clearly record Grace's efforts to reduce fibrous tremolite contamination to the maximum extent feasible.

Vermiculite and its Uses

General Uses

Vermiculite, because of its unique characteristics, lends itself to many uses. In its unexpanded state it finds use as a critical component in the manufacture of fire rated gypsum drywall. In its expanded or exfoliated state it is converted into a very lightweight, non-combustible, free flowing, insoluble, chemically inert, resilient, and non-abrasive material with excellent ion exchange capabilities. These qualities make expanded vermiculite useful in construction, horticulture, and insulation applications, and include consumer type uses such as attic insulation, protection for the base of vinyl-lined, above ground swimming pools ("pool cushion"), use as a carrier for lawn fertilizer and as a horticultural mix component in potting soils, and miscellaneous other applications. The more extensive uses of vermiculite can be categorized as follows:

- (i) Energy Conservation.....Today there is great emphasis being placed on construction methods and fire safety. Vermiculite is an inorganic insulating material, and as a natural material its production is not as energy intensive as most other insulating products, many of which are made from synthetic materials or which utilize petroleum derivatives. Vermiculite has several properties which are unique in relation to the most commonly used insulating materials such as mineral fibers, cellulose fibers, or plastic foam insulating

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materials. These are as follows:

- A. Non-combustibility and permanence in most applications. Vermiculite is used not only for its insulating properties, but to provide fire safety features as well.
- B. Ability to be mixed uniformly with cements such as gypsum and portland cement.

These unique properties lead to important use in a number of construction and insulation applications including the following:

- 1. As an aggregate to produce insulating concrete for use primarily in commercial roof insulation systems. These systems provide good energy saving performance as well as fire resistance characteristics.
- 2. As an effective loose fill insulating material for attic spaces and masonry block walls which in both applications provides long lasting and non-combustible insulating performance.

(ii) Life Protection. Vermiculite is used in the manufacture of a structural fireproofing material called "Mono-Kote", used to help protect the structural steel members of high rise buildings.

Vermiculite, a leading material in this application, is uniquely suited to this purpose because it combines insulating qualities with non-combustion characteristics. Both of these properties are necessary to protect structural steel from deforming in the event of fire. Vermiculite-based structural fireproofing which is applied in wet slurry form is one of a few materials which meets fire code requirements, and in many cases is the structural insulation of choice. Its elimination from the market would have a serious unfavorable impact on the construction industry in the United States. Other vermiculite products are used as fireproofing coatings on cellular plastic type products used in the construction industry. Beyond the importance of vermiculite as a critical component

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in Grace's structural steel fireproofing material, vermiculite is used as a critical component of a mine sealant which is used for the prevention of dangerous roof rock spalling in coal mines. As indicated above, it is also used in fire rated drywall materials. Drywall is in universal use in construction today as a low-cost, efficient building material.

- (iii) Horticultural and Agricultural Uses. Vermiculite is used as an horticultural aggregate and is unique in that its physical air/water relationships are conducive to optimum plant growth. Vermiculite due to its intrinsic, unusual chemical composition contains and slowly releases nutrients (potassium, magnesium and calcium). Vermiculite has good pH buffering characteristics, and supplies cation exchange capacity. In other applications vermiculite acts as a carrier for fertilizer and herbicides. It is uniquely suited for this application in that substitute materials do not have vermiculite's advantage of being able to absorb these materials and slowly release them to the soil. As a soil conditioner vermiculite, a natural material, provides for ion exchange, aeration and moisture retention.

Vermiculite is also utilized in greenhouse growing media as a presterilized substitute for natural topsoil. Natural topsoil is becoming increasingly scarce and must itself be sterilized, a substantially energy intensive process. Further, harvesting soil for horticultural use is detrimental to the environment because it results in stripping land of fertile soil with consequent ecological upset. Sterilized growing media are becoming of greater importance in the need to increase food production by growing plants and vegetables under controlled conditions.

Consumer Uses

As indicated above, expanded vermiculite is used in various consumer type applications. Expected patterns of use relating to vermiculite directly marketed by Grace for such applications are as follows:

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- (i) Attic Insulation. In general, the consumer user of vermiculite as a loose fill attic insulation will purchase vermiculite in quantities of from 10 to 100, 3 cubic foot size bags. Small quantities are purchased for filling voids such as around water pipes to keep them from freezing. Larger quantities are usually used to insulate over existing insulation.

It is estimated that the average house in which vermiculite is used for attic insulation is 30 years old. The application may be completed in one session or in several. Typically, however, the total time which is involved in actually placing vermiculite over existing insulation will average two hours. Once the insulation is in place it is likely to remain undisturbed for the remaining life of the house. It is unlikely that any individual involved in insulating a home with vermiculite would repeat the procedure in a subsequently acquired dwelling more than one or two additional times.

- (ii) Pool Cushion. Use of vermiculite for protection of the base of vinyl-lined above ground swimming pools is carried on out-of-doors and, typically, involves use of no more than 3 to 12, 4 cubic foot size bags of vermiculite depending on the size of the pool.

- (iii) Horticultural Vermiculite. Use of vermiculite for preparation of potting soil is typically carried on out-of-doors or in a potting shed, and involves mixing peat moss with vermiculite. Typically, it would be expected that a 16 quart bag of vermiculite would be utilized by a person making up his or her own potting soil. More often potting soil is purchased in 16 quart or 8 quart bags in which vermiculite has been premixed with peat moss and plant nutrients.

Alternative Uses

Materials alternate to vermiculite for the foregoing and other applications (where such materials are available) are likely to entail higher net cost to the users and, in many instances, are not effective substitutes. Also, responsible authorities have alleged that health risks may

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be associated with substitute materials 6/ such as glass fiber alternatives to vermiculite-based insulation materials and sprayed mineral fiber alternatives to Mono-Kote.

CPSC's Regulatory Approach

Vermiculite Mining

Grace's vermiculite business directly employs 1311 people at locations in over 26 states and accounts for an annual payroll of approximately \$21.5 Million. It is also the source of further employment throughout the construction and horticultural industries.

Vermiculite is mined in five different size gradations at the Libby, Montana location varying from coarse to fine (size 1 down to size 5), and at Enoree, South Carolina in three sizes, mostly medium to fine (size 3 down to size 5). The nature of the ore bodies makes it impossible to mine one ore size and not another. All ore sizes are not interchangeable in their use in production of finished product, some sizes being suitable for one use and not another. For example, coarse sizes are better suited to horticultural or insulation uses than finer sizes, whereas medium sizes are more suited to use as concrete aggregates or in fireproofing materials. Accordingly, the availability of one size ore for one use such as a fireproofing use is dependent on Grace's ability to market other sizes for other uses. Without substantial outlets for all sizes of vermiculite an unmanageable vermiculite ore size imbalance would rapidly occur at the mines which eventually would have a substantial and adverse economic impact on the overall ability of Grace to continue the supply of vermiculite. In sum, burdening vermiculite sold with the unavoidable costs of producing vermiculite not sold could ultimately make the price of Grace's vermiculite prohibitive, thus rendering it economically unavailable for all uses.

Accordingly, if the regulatory approach proposed by CPSC of eliminating products "from which fibers are released" is carried forward to its logical conclusion, one could foresee a situation where any level, however infinitesimal, of asbestos contamination could result in banning of

6/ See the work of Stanton and Pott cited in the EPA ANPR.

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vermiculite use, particularly those uses devoted to consumer type applications. Although less than 10% of all vermiculite sold by Grace is marketed directly by Grace for consumer use, a banning of such use, along with the marketing impact such a ban would have on other uses of vermiculite, would have a material effect on vermiculite ore balance with its attendant adverse consequences.

Another troublesome concern presented by CPSC's proposed regulatory approach to act against uses of asbestos without benefit of a quantitative assessment is that many mineral substances contain trace amounts of naturally occurring mineral fibers which come within the definition of "asbestos." As has been stated above, "rock types in which asbestos minerals might be encountered lie at or near the surface of about 30 to 40 percent of the Continental United States." ^{7/} Even drinking water may contain asbestos fibers resulting from natural contamination. Therefore, materials which contain mineral ingredients may well contain at least trace amounts of asbestos fibers with the risk that some asbestos fiber release may occur. Indeed, given CPSC's and EPA's knowledge that asbestos is a ubiquitous contaminant material, CPSC's proposal is at best impractical, and would make suspect thousands of products, embroiling CPSC in a regulatory enforcement quagmire.

Need for Quantitative Assessment

Any rule which did not include a requirement for quantitative assessment would be of dubious enforceability and could well result in the unintended outlawing of many products and materials which contain only trace amounts of asbestiform minerals. EPA faced this very dilemma in its formulation of the National Emission Standard for Asbestos and prudently included a quantitative 1% asbestos content dry weight basis as the base point for permitting use of spray applied fire proofing materials.

Insofar as Grace is aware, this action has had the intended effect of banning the use of commercial asbestos in spray applied fireproofing materials without banning the use of other materials containing trace asbestiform mineral contaminants. It also provided EPA with an enforceable standard and industry with a reasonable and achievable standard while reducing unreasonable risk of injury. The

^{7/} See page 2, supra.

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quantitative threshold approach clearly lends itself to dealing with the contamination issue.

If CPSC believes it necessary to go beyond the "intentionally added" standard applicable to consumer patching compounds which requires the reduction of asbestos content in product component materials "to the maximum extent feasible", it must adopt a reasonable and achievable quantitative asbestos contamination level.

Limits of Asbestiform Mineral Detectability

Grace and others utilize the step scanning X-ray diffraction technique to quantify the amount of fibrous tremolite contamination associated with both vermiculite and vermiculite-containing products. This accepted and sophisticated technique, which is accurate in quantification of fibrous tremolite contamination to a level of 1% on a dry weight basis, becomes subject to error below the 1% level, and the error factor increases the closer one approaches the limits of detection of this technique which appear to be in the range of 2/10ths of 1%.

Grace, by various and detailed analytical procedures, has been able to assure itself that the percent concentrations of fibrous tremolite contamination associated with its expanded vermiculite products range from a point substantially below 1% down to the limits of detectability of this technique. Grace believes, however, that any quantitative assessment limit less than 1% would be subject to error factors which would pose enforcement problems for CPSC as well as impinge upon available CPSC resources.

CPSC has itself recognized the detection problem and is aware of the extraordinary difficulty and expense involved with asbestos test methodology. 8/ To date CPSC has chosen not to acquire a detection capability. Grace believes this to be a proper course which should remain unchanged given the in place resources and capabilities available at EPA. This course is also consistent with the need to avoid duplication in government facilities.

8/ See CPSC Staff Memorandum to Chronic Hazards Team from Gale D. Wyer, Director, ESHC, Comments on 2/13/78 David W. Baker Memo, "Determination of Free Asbestos in Patching Formulations and Emberizing Products" and test methodology.

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To the extent that CPSC would need technical support in considering an appropriate quantitative contaminant level, it should look to EPA which by reason of statutory mandate, resources and available expertise seems better positioned to provide such support.

Generic Approach

When dealing with the issue of naturally occurring asbestos contamination, a generic approach, in the sense of establishing a percent contamination level, merits consideration. Especially is this so where good enforcement practice as well as social and economic realities rule out a zero standard and dictate setting a realistic, measurable, and achievable contaminant standard.

Respectfully submitted,

W. R. Grace & Co.
Construction Products Division

By


E. R. Williams, Vice President

cc/ Mrs. Joni T. Repasch
Record Clerk
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Docket No., OTS-61005

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